I/WE CLAIM:

1. A method of optical imaging of turbid media using a plurality of discrete wavelengths in an optical imaging system, the method comprising the steps of:

   selecting a set of chromophores for characterizing a property of the turbid media;

   defining parameters of the system including at least a number of said discrete wavelengths, a value of each of said wavelengths, source power and detector aperture for each of said wavelengths, a choice of image algorithm and source/detector geometries, a choice of source and detector and noise characteristics;

   fixing a value of all of said parameters except a plurality of said parameters values to be optimized;

   determining an optimal value for each of said parameter values to be optimized as a function of a performance of the system in measuring a concentration of said chromophores in said turbid media for characterizing said property as a whole; and

   using said optimal value for each of said parameter values in imaging said turbid media.

2. The method of claim 1 wherein said optical imaging system is selected from Time-Domain (TD) modality which generates Temporal Point Spread Functions (TPSF), and Continuous Wave (CW) modality.

3. The method of claim 2, wherein said imaging is medical imaging, said highly turbid medium being body tissue and said property is physiological.

4. The method of claim 3, wherein said parameter values to be optimized comprise a value of each of said wavelengths.

5. The method of claim 4, wherein said parameter values to be optimized further comprise said number of said discrete wavelengths.

6. The method of claim 5, wherein said step of determining comprises fixing said number of discrete wavelengths at each of a plurality of numbers, and determining an optimized performance of the system in measuring a concentration of said chromophores in said turbid media at each of said plurality of wavelengths, and selecting one of said plurality of numbers having a best optimized performance.

7. The method of claim 4, wherein said step of determining an optimal value for each of said parameters comprises minimizing a condition number of a matrix of specific absorption coefficients of said chromophores as a function of wavelength.

8. The method of claim 5, wherein said step of determining an optimal value for each of said parameters comprises minimizing a condition number of a matrix of specific absorption coefficients of said chromophores as a function of wavelength.

9. The method of claim 6, wherein said step of determining an optimal value for each of said parameters comprises minimizing a condition number of a matrix of specific absorption coefficients of said chromophores as a function of wavelength.

10. The method of claim 1, wherein said step of determining comprises empirically determining said performance of the system for a range of said values for each of said parameter values to be optimized.

11. The method of claim 3, wherein said plurality of chromophores comprise at least oxy-hemoglobin and deoxy-hemoglobin.

12. The method of claim 11, wherein said chromophores are water, lipids, oxy-hemoglobin and deoxy-hemoglobin.

13. The method of claim 11, wherein said body tissue is breast tissue.

14. The method of claim 11, wherein said optical imaging system is TPSF-based and wherein said number of wavelengths selected is from 2 to 4.

15. The method of claim 14, wherein said number is 4.

16. The method of claim 12, wherein said imaging system is TPSF-based and wherein values of said wavelengths are 760 nm, 780 nm, 830 nm and 850 nm.

17. The method of claim 1, wherein the step of determining an optimal value of said parameters to be optimized comprises:

deriving an inherent wavelength-dependent sensitivity to noise in calculating said chromophore concentrations, and

determining an optimal correlation of said sensitivity and at least one other of said parameters.

18. The method of claim 17, wherein said imaging system is TPSF-based and wherein one of said parameters to be optimized is a distribution of an acquisition time at each of said wavelengths.

19. The method of claim 1, wherein said imaging system is TPSF-based and wherein one of said parameters to be optimized is a distribution of an acquisition time at each of said wavelengths.

20. The method of claim 19, further comprising a step of determining a minimum value for said acquisition time at which said performance of said system attains a minimum threshold value.

21. The method of claim 1, wherein one of said parameters to be optimized is at least one of said source power and said detector aperture for each of said wavelengths.

22. The method of claim 21 wherein said imaging system is TPSF-based, further comprising a step of determining a minimum value for an acquisition time at which said performance of said system attains a minimum threshold value.